

Aerosol composition from AERONET

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The files presented here represent an attempt to retrieve information about the aerosol composition at all AERONET sites. This version retrieves an internal mixture of soluble inclusions (ammonium nitrate), insoluble dust, black carbon, and water. The host solution is composed of soluble inclusions and water, and the real refractive index for the host solution is calculated using the Tang and Munkelwitz papers. The real refractive index for the mixture of the host solution with the insoluble inclusions (dust and BC) is calculated using the Maxwell Garnett EMA. The black carbon refractive index is $1.95 + 0.79i$ (all wavelengths), black carbon density is 1.8 g cm^{-3} (Bond and Bergstrom, 2006). The dust refractive index is $1.56 + 0.0014$ ($0.55 \mu\text{m}$ wavelength). Additional details may be found at Schuster *et al.* [2009] and Schuster *et al.* [2005].

All retrievals in this dataset have a minimum solar zenith angle of 50 degrees. Monthly climatology requires a minimum of 10 days per month. The Level 2.0 dataset has the same optical depth restriction as the AERONET Level 2.0 database (i.e., $\text{AOD} \geq 0.4$). The Level 1.9 data are obtained by “backfilling” the Level 2.0 dataset with Level 1.5 values. This bypasses the Level 2.0 $\text{AOT}(440) > 0.4$ restriction, but all other AERONET QC criteria are in place. Use Level 1.9 with caution and caveats, as neither the AERONET team or I claim that these retrievals are robust. This data may be useful for qualitative discussion, though.

Cautionary note:

The retrieval provides limited information about the aerosol composition based upon the AERONET refractive index retrievals (an intrinsic aerosol property). Some optical properties of the dry aerosol distribution are also provided, but they should be used with caution. Optical properties such as the dry optical depths and scattering coefficients are sensitive to the details of the size distribution; since particles of all sizes are assumed to have the same hygroscopic growth factors with this retrieval, the optical calculations may suffer.

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References

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